Claims

1. An amphibious vehicle having a wheel mounted to a body of the vehicle so as to be movable from a protracted position, for use of the vehicle on land, to a retracted position, in which the wheel is stowed for use of the vehicle on water, the vehicle further comprising a suspension means to absorb shocks from the wheel during land use and a retraction means for moving the wheel between the protracted and retracted positions, characterised in that the suspension means can be operatively disconnected from the wheel when the wheel is to be retracted.

2. An amphibious vehicle as claimed in claim 1, in which the retraction means can be operatively disconnected from the wheel when the wheel is in the protracted position.

3. An amphibious vehicle as claimed in claim 1 or claim 2, in which the wheel is mounted to the body of the vehicle by means of one or more suspension linkages, the vehicle further comprising suspension disconnect apparatus for operatively connecting the suspension means to, or operatively disconnecting the suspension means from, one of the suspension linkages.

4. An amphibious vehicle as claimed in claim 3, in which the suspension means is operatively connected to one end of a suspension lever arm, the other end of the suspension lever arm being operatively connectable to said one of the suspension linkages by the suspension disconnect apparatus.

5. An amphibious vehicle as claimed in claim 4, in which the said one of the suspension linkages and the lever arm are mounted to the vehicle body for pivotal movement relative to the body about an axis, the suspension disconnect apparatus comprising means movable between a first position in which the said one of the suspension linkages and the suspension lever arm are locked so as to pivot together about the axis and a second position in which said one of the suspension linkages and the suspension lever arm are free to pivot about the axis relative to one another.

6. An amphibious vehicle as claimed in claim 5, in which the suspension disconnect apparatus comprises a bore in the said one of the suspension linkages or in the suspension lever arm, the bore having a number of ball receiving tracks formed over a part of its length, a shaft slidably mounted to the other of the said one of the suspension linkages or the suspension lever arm, the shaft projecting into the bore and having a knuckle about which are mounted a plurality of balls, the shaft being movable from a first position in which the balls are engaged in the tracks to lock the said one of the suspension linkages and the suspension lever arm together for pivotal movement about the axis and a second position in which the balls are not engaged in the tracks and the said one of the suspension linkages and the other end of the suspension lever arm are free to pivot about the axis relative to one another.

7. An amphibious vehicle as claimed in claim 6, in which the suspension disconnect apparatus comprises an actuator to move the shaft between the first and second positions.

8. An amphibious vehicle as claimed in claim 7, in which the actuator is a hydraulic actuator.

9. An amphibious vehicle as claimed in claim 5, in which the said one of the suspension linkages and the suspension lever arm have adjacent drive portions, the suspension disconnect apparatus further comprising a sleeve having drive means for cooperation with corresponding drive means on the drive portions, the sleeve being movable from a first position in which it is in driving cooperation with both of the drive portions to lock the said one of the suspension linkages and the suspension lever arm together for pivotal movement about the axis, and a second position in which it is in driving cooperation with only one of the drive portions such that the linkage and the arm are free to pivot about the axis relative to one another.

10. An amphibious vehicle as claimed in claim 9, in which the sleeve is internally splined for engagement with corresponding splines formed on the drive portions.

11. An amphibious vehicle as claimed in claim 9, in which a bore of the sleeve has a non-circular cross section for driving engagement with correspondingly shaped profiles on the drive portions.

12. An amphibious vehicle as claimed in any one of claims 9 to 11, in which the suspension disconnect apparatus comprises an actuator to move the sleeve between the first and second positions.

13. An amphibious vehicle as claimed in claim 12, in which the actuator is an hydraulic actuator.

14. An amphibious vehicle as claimed in claim 5, in which the said one of the suspension linkages and the suspension lever arm have corresponding drive teeth, the suspension lever arm being movable between a first position in which the drive teeth are engaged so as to lock the said one of the suspension linkages and the suspension lever arm together for pivotal movement about the axis, and a second position in which the drive teeth are disengaged such that the said one of the suspension linkages and the suspension lever arm are free to pivot about the axis relative to one another.

15. An amphibious vehicle as claimed in claim 14, in which the suspension disconnect apparatus comprises an actuator to move the suspension lever arm between the first and second positions.

16. An amphibious vehicle as claimed in claim 15, in which the actuator is a hydraulic actuator.

17. An amphibious vehicle as claimed in claim 3 when dependent on claim 2, in which the vehicle further comprises a retraction disconnect apparatus for operatively connecting the retraction means to, or operatively disconnecting the retraction means from, one of the suspension linkages.

18. An amphibious vehicle as claimed in claim 17, in which the retraction means comprises a retraction actuator operatively connected to one end of a retraction lever arm, the other end of the retraction lever arm being operatively connectable to said one of the suspension linkages through the retraction disconnect apparatus.

19. An amphibious vehicle as claimed in claim 18, in which the said one of the suspension linkages and the retraction lever arm are mounted to the vehicle body for pivotal movement relative to the vehicle body about an axis, the retraction disconnect apparatus comprising means for locking the said one of the suspension linkages and the retraction lever arm together for pivotal movement about the axis.

20. An amphibious vehicle as claimed in claim 19, in which the retraction disconnect apparatus comprises a pneumatic clutch.

21. An amphibious vehicle as claimed in claim 20, in which the clutch inter-connects the said one of the suspension linkages and the retraction lever arm such that when the clutch is engaged the said one of the suspension linkages and the retraction lever arm are locked together for pivotal movement about the axis and that when the clutch is disengaged, the said one of the suspension linkages and the retraction lever arm are free to rotate about the axis relative to one another.

22. An amphibious vehicle as claimed in claim 20, in which the said one of the suspension linkages is rotationally fast with a shaft, the pneumatic clutch having a first component which is also rotationally fast with the shaft and a second component attached so as to be rotationally fast with the retraction lever arm, the clutch being adapted such that when it is engaged the first and second components are rotationally fast so as to lock the said one of the suspension linkages and the retraction lever arm together for pivotal movement about the axis.

23. An amphibious vehicle as claimed in any previous claim, in which the wheel is connected to the vehicle body by an upper suspension linkage and a lower suspension linkage.

24. An amphibious vehicle as claimed in claim 23, in which the suspension means is connectable to the upper suspension linkage.

25. An amphibious vehicle as claimed in claim 23, in which the suspension means is connectable to the lower suspension linkage.

26. An amphibious vehicle as claimed in claim 24 or claim 25, in which the retraction means is connectable to the lower suspension linkage.

27. An amphibious vehicle as claimed in any previous claim, in which the suspension means comprises a strut having a coil spring mounted about a telescopic hydraulic damper.

28. An amphibious vehicle as claimed in any previous claim, in which the retraction means comprises a double acting fluid ram.

29. An amphibious vehicle as claimed in any of claims 1 to 27, in which the retraction means comprises an electrically driven ram.

30. An amphibious vehicle substantially as hereinbefore described, with reference to and as illustrated in Figures 1A to 1C and Figure 2, when modified in accordance with any one of Figures 3 to 5 and Figure 6, or as Illustrated in Figures 1A to 1C and Figures 7 and 8 of the accompanying drawings.